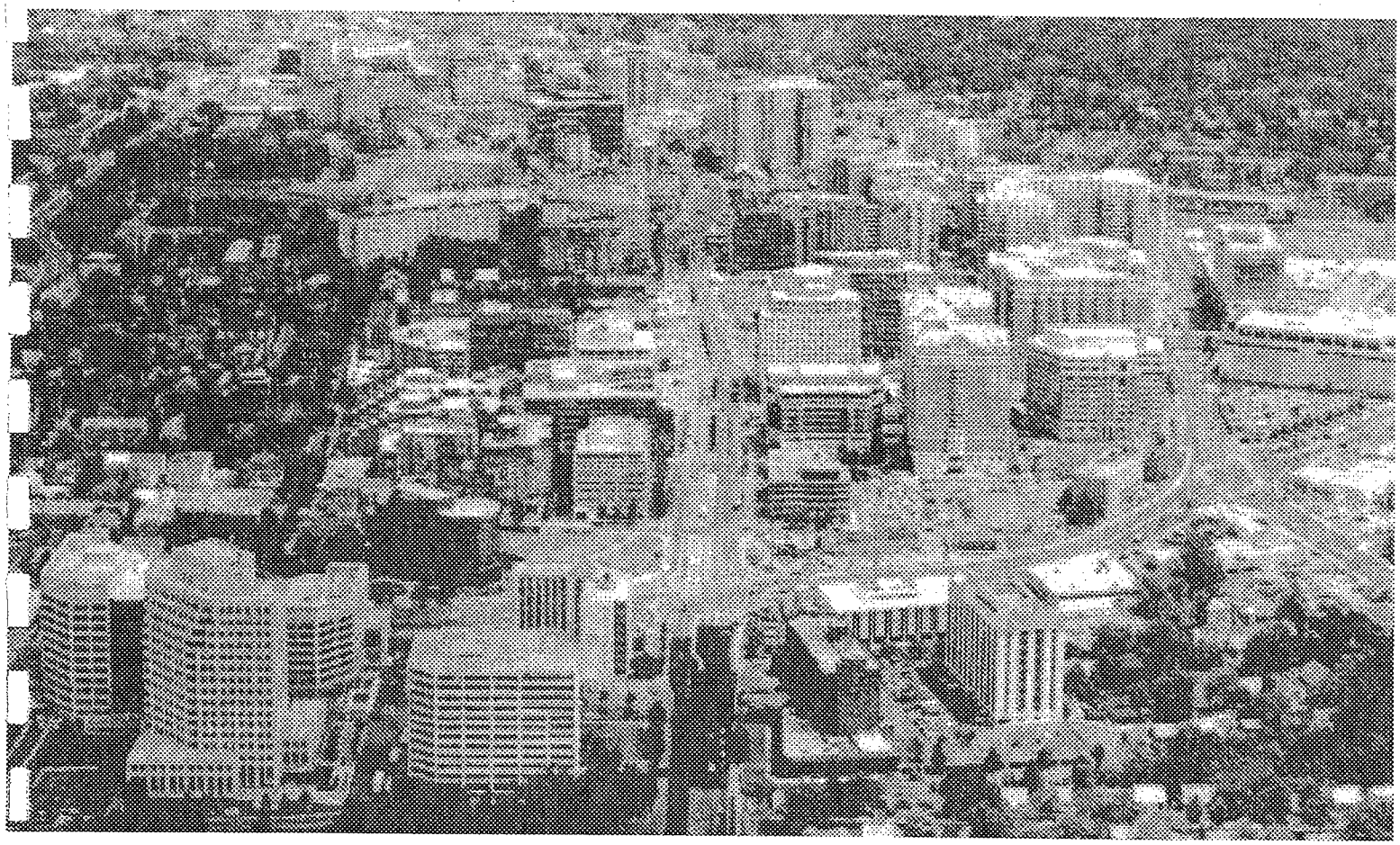


A tale of two efforts to build suburban centers at suburban rail stations. Top, Ballston, Virginia, on the Washington Metro's Orange Line, one of several similar subcenters there. Bottom, Pleasant Hill, California, on BART's Concord Line, the largest new development at a previously greenfield station site.

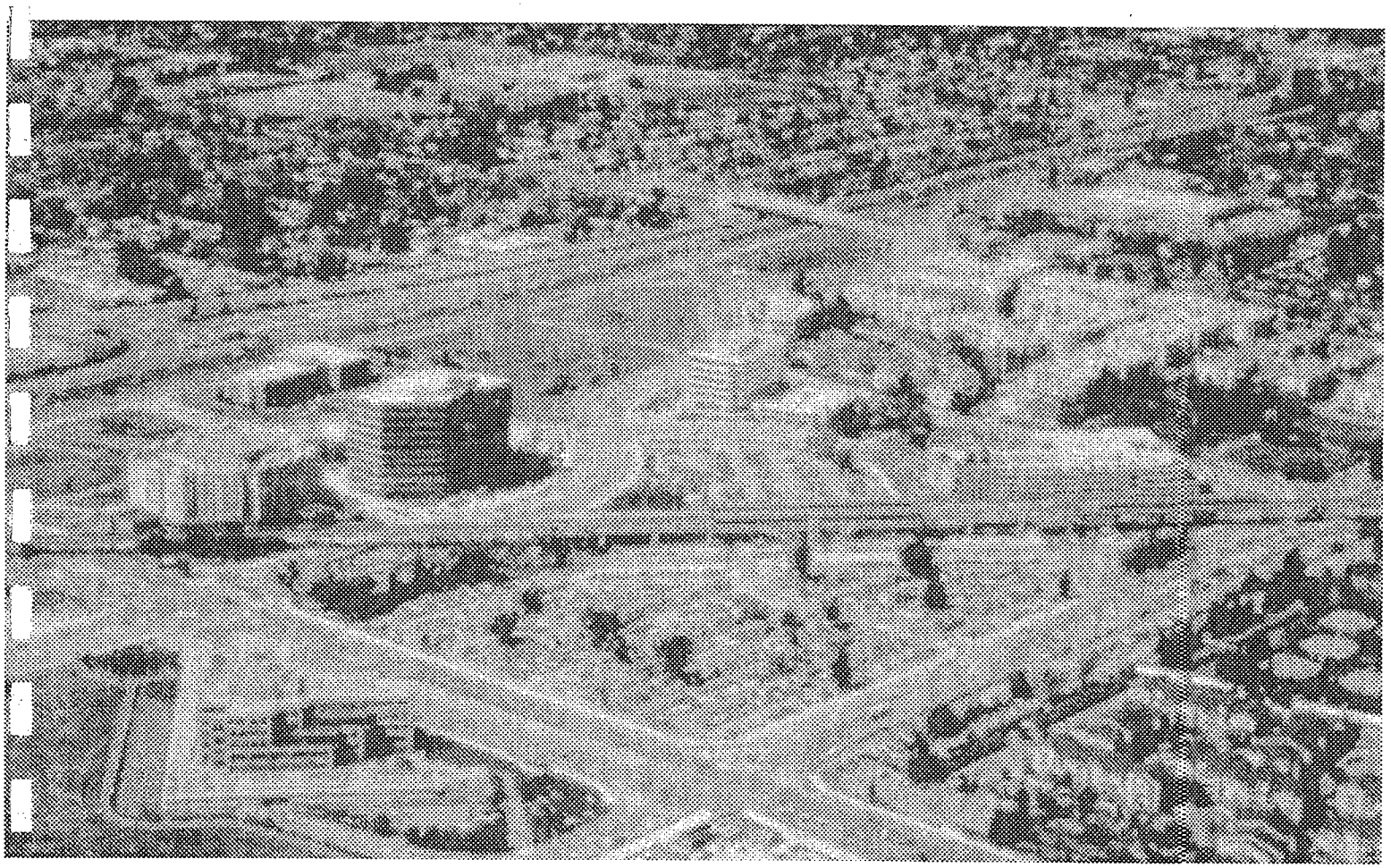
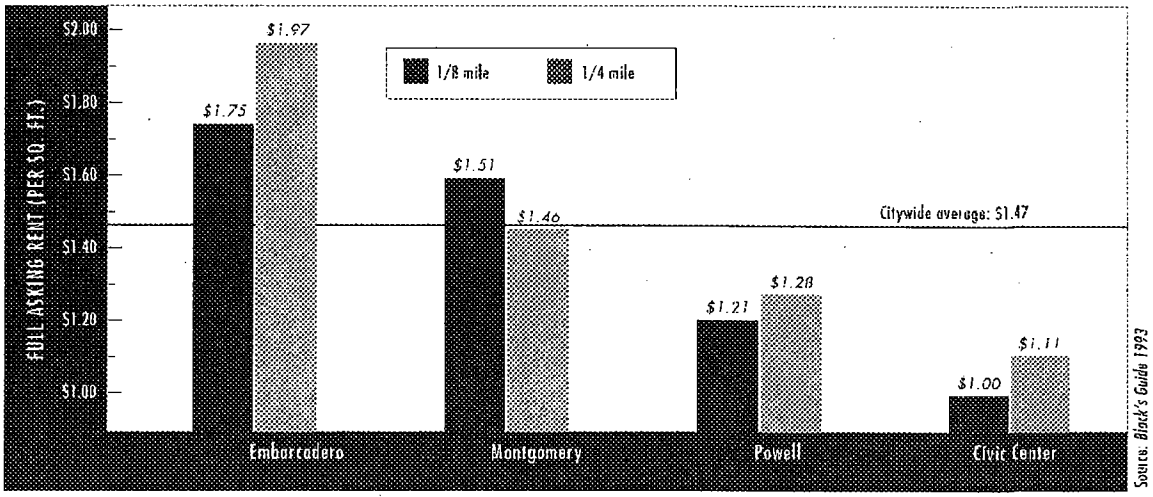


FIGURE 6

Average 1993 office rents in 1/8-mile distance rings from downtown San Francisco BART stations



If indeed office tenants do value accessibility to BART, then one would expect to find higher office rents for buildings closer to BART stations. Figure 6 shows that no such pattern is evident.

If proximity to BART makes a building more attractive to potential tenants, then one would also expect to find higher occupancy rates for buildings closer to BART stations. To a limited extent, this was indeed the case in 1993—especially for the two BART stations in San Francisco's financial district. When we looked more closely we found the higher occupancy levels associated with BART instead reflected improved building quality, not access to BART. These results confirm the observations of many commercial brokers: that office space is increasingly becoming a commodity and that rents follow the ever-changing balance of supply and demand and building characteristics more than location.

RETAIL ACTIVITY NEAR BART

BART was planned and constructed before the idea that transit stations should serve as neighborhood retail centers, or "transit villages," became as popular as it is today. Food is not allowed in BART stations or on BART trains, and no BART station includes significant internal retail space. Even at El Cerrito Plaza and Bayfair, the two BART stations which directly serve regional malls, station-shopping access is not as good as it could be.

These problems notwithstanding, there is a substantial amount of retail activity close to many BART stations. Major new retail projects have been developed adjacent to the Rockridge, Oakland-12th Street, El Cerrito del Norte, and Powell Street BART stations, and others are currently planned for the Fruitvale and Pleasant Hill BART stations.

How have the stores located at or near BART stations fared? Does being near a BART station boost customer traffic or sales? And are there any disadvantages to locating near a BART station?

Lacking area or retailer-specific information on retail sale volume, we developed and administered a brief questionnaire to all retailers located within a quarter-mile of twelve BART stations. The majority of respondents (54 percent) were long established at their current near-BART locations. Only 14 percent had been in business at their current (BART) locations for less than a year, while another 32 percent had been in business at their current locations for one to five years.

Close proximity to BART had been a very important consideration in their initial location decision, said 23 percent of respondents. Another 32 percent reported that BART proximity had been somewhat important. But an even larger number—45 percent—said that being near BART had not been a major consideration in their choice of location.

Opinions also varied widely regarding the contribution of BART to retail sales. Sample-wide, 14 percent of survey respondents believed BART contributed positively to their sales. Another 51 percent cited BART proximity as being only somewhat important to their business and sales, and one-third cited BART as having no effect. Furthermore, the longer retailers had been in business near BART, the less positively they viewed BART's contribution to sales.

Few weekday BART riders actually shop near BART stations—at least according to the survey respondents. Some 55 percent calculated that fewer than one in ten BART riders actually shopped at their stores. Only 7 percent thought that local BART riders comprised more than half their customer base. ▻

Restaurants and food stores were more likely to capture BART patrons than service businesses.

Forty-four percent of respondents cited customer and employee convenience as the primary advantage of being located near a BART station. Another 39 percent listed more customers as a major advantage. Greater visibility, additional pedestrian traffic, and BART's role as an area landmark were listed as major advantages by 20 percent, 15 percent, and 11 percent of respondents, respectively. Merchandise retailers perceived more advantages to being near BART than did restaurants, food stores, or service businesses.

On the other hand, almost a third of the survey respondents didn't list any disadvantages associated with being located near BART, although one-third cited the presence of "unwelcome people," and 22 percent cited reduced safety and security as key concerns. Merchandise retailers perceived more disadvantages from being located near BART than did other businesses—just as they also perceived more advantages. Retailers who had been in business a long time were neither more nor less likely to find specific faults than were retailers who had just opened up.

All in all, most respondents were happy with their locations. Sample-wide, 69 percent of respondents identified their current near-BART location as an ideal business location. Only 14 percent wanted to be located closer to a BART station, while only 10 percent preferred to be located farther away. Seven percent of respondents cited their ideal location as "nowhere near BART."

CONCLUSIONS

The story of BART and its effects on the metropolitan landscape of the Bay Area is complicated—composed of one very big achievement, several smaller successes, and many missed opportunities.

BART's major achievement has been to link downtown San Francisco with the growing suburbs of central Contra Costa County. This has allowed San Francisco to maintain its preeminence as the business and financial center of the Bay Area, even as regional auto use and traffic congestion have increased many times over. On a more modest scale, BART has helped spark new commercial and residential development around several suburban stations, most notably Walnut Creek, Pleasant Hill, Concord, and Fremont.

There have also been some notable failures. So far, BART has not triggered hoped-for levels of reinvestment in downtown Berkeley, Oakland, or Richmond. BART's land use effects on the Richmond and Fremont lines as a whole have been much less than were expected. Except for the Rockridge station in Oakland, BART has done little to encourage new retail development.

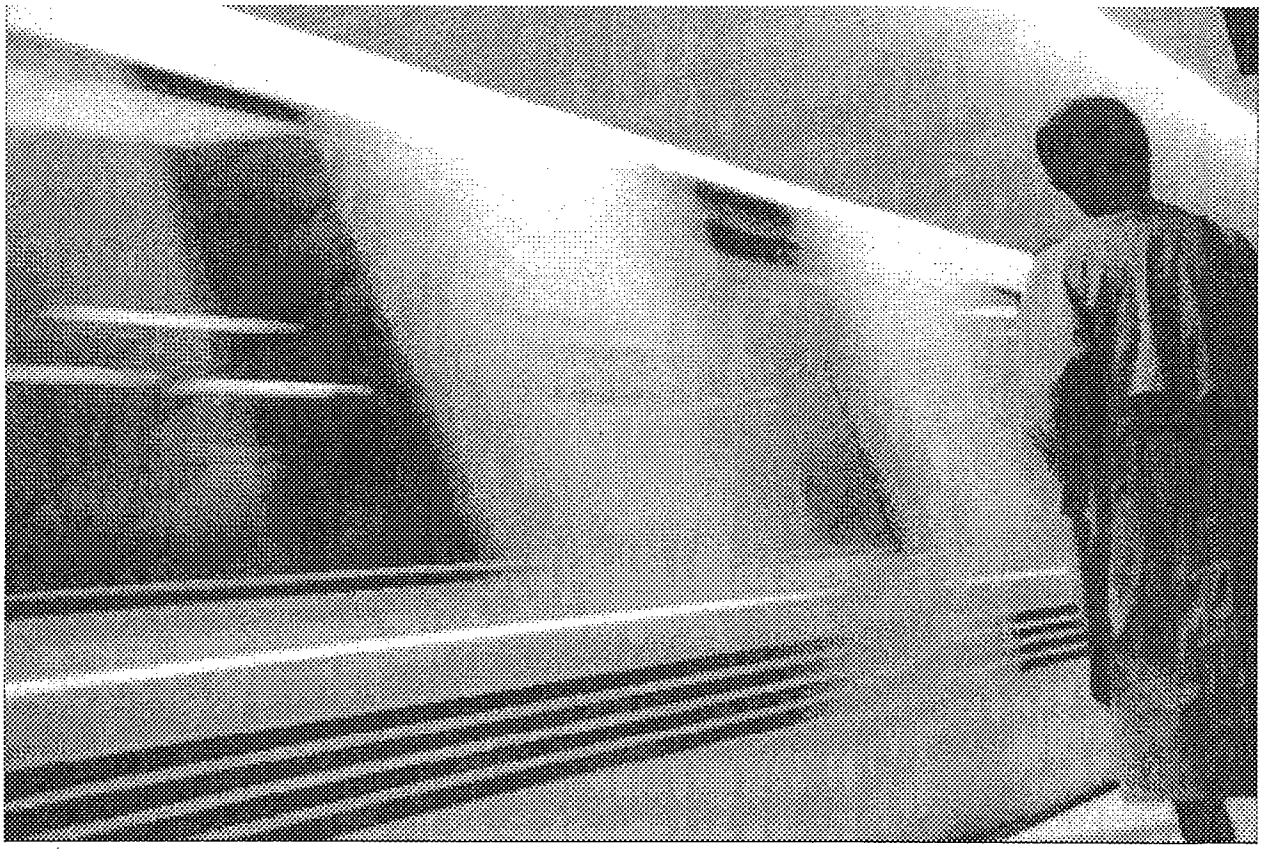
There are many reasons why BART's land use and development effects have to date been so modest. BART is essentially a commuter railroad, and the fact that most suburban BART stations are either surrounded by parking lots or in freeway medians has made nearby development difficult. In Berkeley, El Cerrito, and parts of San Francisco, neighborhood groups have long opposed more dense development around BART. Site assembly and financing difficulties combined with a lack of commercial demand have stifled station-area development along the Fremont line. BART has long insisted that new station-area developments provide free replacement parking, but that renders many projects economically infeasible. In short, the accessibility benefits from BART as capitalized into station-area land values have not been sufficient to overcome either weak local real estate markets or entrenched opposition to development.

Might things be different in the future? The success of the BART Rockridge station as well as recent evidence from Portland

FIGURE 7

BART station area retailer survey: advantages and disadvantages of near-BART locations

ADVANTAGES OF BEING LOCATED NEAR BART	Percentage of respondents answering	DISADVANTAGES OF BEING LOCATED NEAR BART	Percentage of respondents answering
Employee and customer convenience	43.2	Unwelcome people	32.2
More customers	38.7	Reduced safety and security	21.7
Greater visibility and exposure	20.0	Parking problems	13.0
More pedestrian traffic	14.8	Reduced sales volume	7.8
Near landmark	11.0	Lack of cleanliness	5.2
Easy and available parking	1.3	Congestion	5.2
Greater safety and security	1.3	Noise	2.6
Advertising	0.6	Image problems	0.9
None	12.9	None	30.4



indicate that there is a large untapped market for quality, mixed-use residential development within walking distance of regional rail transit. Successful experiences in metropolitan areas like Washington, D.C. and San Diego suggest that transit can be a catalyst to development where local governments, imaginative private developers, and transit agencies are able to work cooperatively together to overcome site assembly, design, financing, and entitlement barriers.

Overall, our findings confirm that the land use benefits from investments in rail transit are not automatic. Rail transit can contribute to positive change, but rarely creates change by itself. The hardware needs software—supportive land use policies such as density bonuses and ancillary infrastructure improvements—if it is to reap significant dividends.

BART is presently embarking on the largest expansion program in its history, with some 25 miles of suburban extensions at various stages of planning and completion. The degree to which Bay Area localities attempt to leverage BART's gift of improved accessibility will determine the land use effects of both existing and future investments over coming years. We trust there will be a BART@50 study to see if we are right. ◆

FURTHER READING

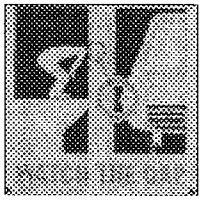
Blayney Associates/David M. Dornbusch & Co., Inc., *Land Use and Urban Development Impacts of BART* (San Francisco, CA: Metropolitan Transportation Commission, 1979).

Robert Cervero, "Rail Transit and Joint Development: Land Market Impacts in Washington, D.C. and Atlanta," *Journal of the American Planning Association* 60 (1): 83–90. 1993.

Robert Cervero and John Landis, "Twenty Years of BART: Land Use and Development Impacts," *Transportation Research* 31 (4): 309–333. 1996.

John Landis, Subrajit Guhathakurta, Ming Zhang, and William Huang, "Rail Transit Investments, Real Estate Values, and Land Use Change: A Comparative Analysis of Five California Rail Transit Systems," UC Transportation Center/ Berkeley Institute of Urban and Regional Development, Monograph 48. 1995.

Melvin Webber, "The BART Experience: What Have We Learned?" *The Public Interest* 45. 1976.



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Memorandum

TO: Transportation-Land Use Task Force Members DATE: July 19, 2004

FR: Valerie Knepper

RE: MTC TOD Study: Res. 3434 TOD Guiding Principles and Policy Approach Options

The purpose of this memo is to provide information regarding MTC staff's current thinking regarding "Guiding Principles" and to describe policy options to detail the MTC requirements for supportive land use policies for programming of Res. 3434 regional transit discretionary funds. Most importantly, the purpose of this item is for MTC staff and our consultants to receive feedback regarding the draft principles and policy options.

I. Draft TOD Guiding Principles

The following "TOD Guiding Principles" are intended to provide simple and clear statements that will guide our development of specific policies.

(a) Increase Transit Ridership By Encouraging Higher Density Development Around Stations. One of the key goals of the TOD policy is to increase transit ridership by providing more opportunities for people to live and work in close proximity to key transit stations and hubs. The TOD study will help MTC define minimum housing and employment densities that will maximize potential ridership, and thus cost-effectiveness, for new public transit investments funded under Resolution 3434.

(b) Ensure New Transit Villages are Livable and Vibrant Places. While generating transit ridership is a critical goal for any transit-oriented development policies MTC adopts, we are also looking to affirm that more compact development patterns and higher density residential and commercial growth around transit hubs bring with them livability, green spaces and other key quality-of-life features.

(c) Develop Criteria That Are Tailored. A key concept in defining "supportive land use policies" is to match the land use density and mix of uses to the ridership and access needs of specific transit modes (i.e., heavy rail, light rail, buses, ferries). In addition, policies must take into account the geographic diversity of the region and the variations in urban and suburban settings.

II. Policy Approaches for Defining "Supportive Land Use Policies" for Res. 3434

In December 2003, MTC adopted the policy that the programming of regional discretionary transit funds for Res. 3434 projects would require supportive land use policies by local jurisdictions. Indeed, the original Res. 3434 included a requirement for supportive land use

policies. A major objective of the current TOD study is to develop an explicit and well-founded approach to implement this policy direction.

(a) Review of Existing Transit Oriented Development Policies

As a first step in this process, the TOD Study began by reviewing and summarizing policy approaches that support TOD development from both outside the region and from within the region. The consultants have developed a draft summary that reviews several important existing transit oriented development policies, and will provide a brief summary to you. In addition, they will discuss lessons learned from this review that appear relevant to the development of policies in the Bay Area.

(b) Conceptual Policy Approaches

Based on the guiding principles above and staff review of existing TOD policies, the following basic policy approaches can be considered. MTC staff anticipates including more than one policy option in the draft T-2030 (MTC's next regional transportation plan), to be released for public comment in the fall of 2004. (Please note that there are numerous and important variations and details needed to flesh out these approaches, which will be the subject of further discussions, but we are requesting your feedback on basic policy options at this point.)

1. Option 1: Transit Ridership Requirements

The most common approach by transit agencies to requirements for supportive land use policies has been to require that the station and/or corridor generate a target level of ridership. The level of ridership threshold and the limitations of other forms of access implicitly point to a level of needed density immediately around transit stations/hubs to satisfy the requirements/be highly ranked for this criterion. This basic approach, with important additional features, is used by the Federal Transit Administration for new transit starts using federal funds and by BART for achieving a recommendation to move forward into later stages of development. Given that land use development takes time, this approach may require progressively more concrete policy, regulatory and legal commitments by local jurisdictions to support achievement of the ridership levels.

2. Option 2: Density Requirements

Another approach is to directly require target levels of land use development matched to the needs of the proposed transit mode (i.e., heavy rail requires more ridership and thus would require higher levels of density than would light rail). This approach defines requirements closer to the control of local jurisdictions – i.e. land use planning and zoning controls. Density requirements can be defined in terms of residential density (e.g. 40 units an acre) or the number of people located around a station/corridor (e.g., 20,000 people within 1 mile). It can also be defined in term of residents only, or both residents and workers. As above, this approach may require progressively more concrete policy commitments by local jurisdictions over the timeline of the project.

3. Option 3: Point System Incorporating both Density and Design Requirements

Given that MTC has a strong commitment to improving the livability of our communities, and the positive influence of the design of places on walk and bike access to transit stations /hubs, another approach would be to include both targeted levels of density, (to be defined as per the discussion

above) and design requirements that facilitate non-auto access to transit stations/hubs. These factors would be combined into a point system that would reward both the level of development and also design features such as connecting streets and sidewalks, bike routes directly into stations, landscaping designed for pedestrians, and facilitation of pedestrian scaled retail and other activities.

4. Option 4: Matching Place Types and Mode

Different transit stations play different roles in the regional transit system, and while each station must generate sufficient use to be justified, and the entire corridor must generate sufficient use to be cost effective, the type of use may differ from station to station. These different patterns of use are termed "types" and include as basic types urban downtown, suburban center, and suburban village. Each of the types of transit modes (e.g. heavy rail, etc) interacts with each of the place types. For example, a heavy rail system in an urban downtown may have very high ridership levels by serving as an employment center, and may not have much residential use in the proximity. On the other hand, a light rail station in a suburban center may have high mixed use, while in a suburban village may have high residential densities. This approach would establish development requirements for types of transit and place type combinations.

We look forward to your input, ideas and recommendations.

BAY AREA TRANSIT ORIENTED DEVELOPMENT (TOD) STUDY

PURPOSE, KEY QUESTIONS AND STUDY APPROACH

Study Purpose

The Transit Oriented Development (TOD) Study will assess the opportunities, benefits and barriers for increased levels of TOD in the San Francisco Bay Area, and help define MTC's policies in support of Bay Area TODs. Specifically, this study will recommend policies for conditioning regional discretionary funds under MTC's control for Resolution 3434 transit expansion projects on the demonstration of supportive land use policies by local government around transit stations and along key transit corridors. This direction was adopted in principle as part of Resolution 3434 and reaffirmed in the Commission's approval of the draft five-point transportation-land use platform in December 2003. This study will play an instrumental role in defining and implementing this policy, and will be conducted in close partnership with ABAG, transit agencies, local governments and other interested stakeholders.

Key Questions and Study Approach

The following key questions will be addressed in the study:

Question 1 - How much opportunity for TOD exists in the Bay Area, what kinds of opportunities are there, and where are they? What does the best-case scenario for TOD look like regionally? What different types of opportunities for TOD are there in the region?

- *Work with ABAG to estimate the potential regional size and impact of TOD in the Bay Area. Summarize current, future and "best case TOD" conditions next to transit stations and in transit corridors in the Bay Area, including demographics, land use conditions, local policies, and transit ridership impacts. Identify types of TOD opportunities in the Bay Area by transit mode and other characteristics.*

Question 2 – What policies to support transit oriented development are being used in other areas of the country, as well as within the Bay Area?

- *Summarize regional policies to support TODs, including different regional policy approaches and incentive programs from outside the Bay Area, and relevant policies from within the region.*

Question 3 – What are the components of an effective regional policy to support TOD in the Bay Area?

- *Assess the lessons learned from other regions and from within the Bay Area.*
- *Assess the existing transportation and land use planning processes within our region, and the unique characteristics and diversity of the Bay Area.*
- *Propose policy planning approaches that more closely link regional transit investments with corresponding levels of local land use development policies.*

Question 4 – How do we test and evaluate the potential policy approaches as proposed?

- *Develop and review the proposed approach with technical advisors, policy advisors, and the public.*
- *Conduct case studies with local jurisdictions to analyze the effectiveness of the proposed policies in detail. Refine the policy approach based on partner feedback and further analysis.*
- *Refine the policies based on the feedback and findings from the case studies.*

Question 5 – What is the objective of the TOD Study?

- *Recommend policies for conditioning regional discretionary funds under MTC's control for Resolution 3434 transit expansion projects on the demonstration of supportive land use policies by local government around transit stations and along key transit corridors.*

BAY AREA TRANSIT ORIENTED DEVELOPMENT (TOD) STUDY

PROJECT SCHEDULE (abbreviated)

Task #	Task Description	Completion Date
1	Refined project scope and schedule	June 1, 2004
2	Summary of policy approaches/ incentive programs from outside and within the Bay Area to support TODs. Lessons learned relevant to MTC policy development.	June 18, 2004
3	Analyses of land use and demographics (current, future and "best case TOD") conditions and plans proximate to transit stations/hubs/corridors • Population, household and employment information in the areas immediately proximate to current and future transit stations, hubs and corridors for existing, forecast future, and "Best Case TOD" scenarios • Planned land use from local General Plans proximate to transit	August 30, 2004
4	Types of Bay Area TOD opportunities and relevance to development of policies • Types of Bay Area TOD opportunities, distribution of TOD opportunity types, and the relevance to the development of MTC policies. • Issues and opportunities relevant to each type of TOD opportunity, and implications for supportive regional policies. • Regional market conditions for development in transit corridors / stations of the regional "Best Case TOD" scenario. • Estimate of regional transit ridership impacts of the "Best Case TOD"	July 30, 2004
5	Overall regional policy approaches to support matched development of land use and transportation • Potential policy approaches including incentives and performance measures. • Potential performance measures for minimum densities and intensities for the programming of transit expansion funds under MTC's Resolution 3434 on supportive land use policies by local jurisdictions. • Effective approaches for achieving supportive local land use policies.	August 27, 2004
6	Case studies analyses. For each location: • Existing conditions and current plans, report on site tour and discussions with local planners and interests • Summaries of opportunities, including the market assessment and land use potential. • Summaries of the relative ridership estimates from TOD. • Recommended solutions or approaches to address any impediments to development of TOD • Recommending refinements to MTC's policy approach.	April 30, 2005
7	Final Report, PowerPoint presentation, Briefing Book	June 1, 2005

ATTACHMENT 3b-1
Transportation and Land Use Policy Platform

1. **Develop a transportation/land use policy statement for the Transportation 2030 Plan.**
   - Develop a clear transportation/land use policy statement that provides a framework for evaluating the land use implications of major project and program choices in the Transportation 2030 Plan.
   - Focus on assessing transportation projects and programs specifically, as a complement to the other elements of the Smart Growth Project recommendations dealing with housing, open space preservation, socio-economic location/displacement.
   - Develop in cooperation with transportation, regional, and local government partners.

2. **Determine an appropriate percentage of TLC/HIP program that should fund specific plan development around existing or near-term future rail stations or corridors.**
   - Complement discreet, community/neighborhood scale improvement projects of the TLC/HIP program with broader land use strategies.
   - In partnership with ABAG's corridor planning initiative, enhance the potential for transit oriented development by providing financial support of specific plans detailing developable parcels, zoning requirements and mitigation hazards in areas around transit stations or along transit corridors.

3. **Encourage changes to local general plans that support Transit Oriented Development for Resolution 3434 investments.**
   - Promote development of land uses adjacent to major transit extensions, to support ridership markets that will make these investments economically feasible.
   - Condition the award of regional discretionary funds under MTC's control for Resolution 3434 expansion projects, on the demonstration by local government that plans are in place supporting some level of increased housing/employment/mixed use density around transit stations/transfer centers.

4. **Support transportation/land use coordination beyond transit corridors.**
   - Continue to pursue neighborhood scale access improvements (bike/pedestrian/local transit) outside of the rail/major transit corridor network, highlighted through the TLC program.
   - In conjunction with ABAG, develop a housing location strategy in tandem with a jobs location/economic development strategy, to recognize the synergistic commute relationships between the two.
   - Develop a regional open space strategy, in conjunction with ABAG, which would reinforce infill development as a priority for growth in cities and established suburbs.

5. **Coordinate transportation/land use issues with regional neighbors**
   - Pursue cooperative planning with neighboring regions to the north (SACOG region and Lake and Mendocino counties), east (San Joaquin and Stanislaus counties) and south (San Benito, Monterey and Santa Cruz counties) of the Bay Area.
   - Identify and resolve data gaps or inconsistencies in long range demographic forecasts (what are these regions projecting for future jobs and housing?), as well as travel projections on key transportation facilities connecting the MTC region to its neighbors—I-80, I-580, US 101-North; US 101- South, State Hwy 17 and State Hwy 1.

EXHIBIT 4

Dr. Karen Weissman Comments

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August 27, 2004
TRA File: LGWD

Mr. Thomas Enslow
Adams Broadwell Joseph & Cardozo
651 Gateway Boulevard, Suite 900
South San Francisco, CA 94080

RE: California High-Speed Train Program EIR/EIS

Dear Mr. Enslow:

I have reviewed the subject EIR/EIS on the proposed high speed rail project, specifically in regard to the biological impacts to the Grassland Ecological Area (GEA) and Grassland Water District (GWD) of Merced County.

I. Introduction - The Draft EIR/S Fails to Analyze Its Impact on the Grassland Ecological Area (GEA)

Draft EIR/S contains no mention of the unique resources of the GEA or GWD.

The Draft EIR/S fails to mention or analyze the project impact specifically on the Grassland Ecological Area (GEA). In its discussion of the environmental setting, the Draft EIR/S mentions in general terms the number of acres of wetland in the Merced County area and lists plant and animal species of concern based on the California Natural Diversity Data Base (CNDDB) that are within the pre-defined impact zone of 1/4 mile on either side of the track or a train station.

Importance of the GEA

The Draft EIR/S has vastly underestimated the project impacts in Merced County because it fails to recognize the special importance of the Grassland Ecological Area (GEA) and Grassland Water District (GWD). The Draft EIR/S does not even mention the existence of the GEA or GWD.

The GEA includes a total area of 179,474 acres, which encompasses two federal wildlife refuges, three state wildlife areas and privately owned wetlands, including duck clubs. The Grassland Water District supplies water to the 5 public refuges and 159 duck clubs in on 51,537 acres within the greater GEA area. This area of year-round and seasonal wetlands, riparian corridors and native grasslands provides habitat for more than 550 species of plants and animals, including 47 species that have been federally listed as threatened, endangered or sensitive (GWD, 1997). Over a million waterfowl regularly are found in the GEA during the winter months.

The GEA is of considerable importance because it preserves a variety of habitats important to the maintenance of biodiversity on a local, regional, national and international scale. It has been estimated that 30 percent of the Central Valley migratory population of waterfowl use this area for winter foraging. (U.S. Bureau of Reclamation, Final NEPA EA, Refuge Water Supply Long-Term Water Supply Agreements (January 2002).) The GEA is a major wintering ground for migratory waterfowl and shorebirds of the Pacific Flyway and the Western Hemisphere Shorebird Reserve Network has designated the GEA as one of only 22 international shorebird reserves in the world. (Fredrickson, Leigh H. and Laubhan, Murray K, Land Use Impacts and Habitat Preservation in the Grasslands of Western Merced County, CA (February 1995), p.3.)

In addition to providing critical biological habitat, the Grassland wetlands provide substantial direct economic contributions to the local and regional economies. The GEA receives over 300,000 user visits per year for hunting, fishing and non-consumptive wildlife recreation. (Id. at p. 14). Recreational and other activities related to habitat values within the GEA contributes $41 million per year to the Merced County economy, and accounts for approximately 800 jobs. (Id. at p. 21.)

The GEA also includes a large and growing portfolio of federal, state and private conservation easements. (Grasslands Water District, Land Use and Economics Study: Grasslands Ecological Area (July 2001), pp. 11-12.) Through 1998, conservation easements had been acquired on over 64,000 acres at a total cost of over $28 million. (Id.)

The omission of the GEA as a major zone of biological concern is a major flaw in the Draft EIR/S since it results in the incomplete assessment and an underestimation of the direct and indirect impacts of the high-speed rail project on this key resource area. The entire assessment of biological impacts to the Merced County area in the EIR/S is limited to just the following paragraphs:

> "The southern route across the Pacheco Pass, which follows SR-152, would impact approximately 100,000 more linear ft (30,480 m) of jurisdictional waters than the northern tunnel option (Diablo Range direct). The HST segment using the northern tunnel under Henry Coe option would involve the fewest wetland impacts. (Page 3.15-22)"

> "Segments that would be placed at grade (cut and fill) would require fencing the HST alignment for the safety of humans, as well as protection from train-wildlife collisions, and would have the potential to interfere with wildlife movement. Placement of overpasses, underpasses, and tunnels along these alignments could provide for movement of wide-ranging and migratory species. The proposed HST Alternative would potentially impact a relatively small percentage of wetlands compared to the Modal Alternative (from approximately 2.8% for the Bay Area to Merced segment with the Oakland to San Jose East plus tunnel under Henry Coe State Park. (P. 3-15-22)."

The foregoing is an extremely cursory and incomplete assessment of the project's potential effects on the sensitive biological resources of the GEA. A complete assessment must include construction, operations, and induced growth impacts on wildlife species, notably the

many species of resident and migratory waterfowl, as well as other sensitive mammalian wildlife such as the federally endangered San Joaquin kit fox, as well as badger, and tule elk.

II. Construction impacts of the HST on the GEA must be addressed in the EIR/S (truck traffic, equipment storage and laydown areas, noise of pile-driving and other heavy equipment operation , disruption of water supply deliveries)

The Draft EIR/S needs to consider construction impacts on the wetlands complex including the impacts of truck and other vehicular traffic, equipment storage and laydown areas, blasting, and pile-driving, as well as temporary disruption of water supply deliveries.

Impacts of vehicular traffic include collisions with animals, noise and dust. The Draft EIR/S should consider the amount of time the project will be under construction within the GEA and estimate the likely number of animals that could be killed in collisions with construction vehicles. This is an impact that is largely unmitigatable. The impact is exacerbated because the construction vehicles must travel on roads in the wetlands that normally receive very little traffic of any kind.

Equipment storage and laydown areas may be located in sensitive habitat areas containing rare plants, mammal dens or bird's nests. These areas will destroy habitat and disrupt the activities of animals using the habitat.

Noise

Noise sources include blasting, pile driving, and trucks traveling, loading and unloading, motors, compressors etc. or other heavy equipment that will operate out in the open for construction of the rail bed and support structures for the train. These noise sources will impact wildlife in the vicinity of the construction zones for a considerable period of time as construction progresses.

Noise impact on wildlife is an area of active study at present. For example, noise disturbances displace waterfowl from feeding grounds, cause desertion of nests, increase energetic costs associated with flight, and lower productivity of nesting or brooding waterfowl, among other impacts. (Human Disturbances of Waterfowl: Causes, Effects, and Management, URL:http://www.nwrc.usgs.gov/wdb/pub/wmh/13_2_15.pdf.) (e.g. Carl E. Korschgen, U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center, (1992).

Direct physiological effects of noise on wildlife, if present, are difficult to measure in the field; telemetric measurement of physiological variables such as heart rate has met with more success technically than as an indicator of health and survival. Behavioral effects that might decrease chances surviving and reproducing include retreat from favorable habitat near noise sources and reduction of time spent feeding with resulting energy depletion. Serious effects such as decreased reproductive success have been documented in some studies and documented to be lacking in other studies on other species. Decreased responsiveness after repeated noises is frequently observed and usually attributed to habituation. Vehicle noise can interfere with animal communication essential for reproduction. (Ronald P. Larkin, Center for Wildlife and Plant Ecology, USACERL Technical Report 96/21, January 1996)

In a comprehensive 1998 report (U. S. Department of Transportation, Federal Railroad Administration, December 1998, *High-Speed Ground Transportation Noise and Vibration*

Impact Assessment (URL: http://www.fra.dot.gov/downloads/RRDev/nvman.pdf), the following was the government's assessment of noise impacts on animals:

> "A wide range of studies have been conducted concerning noise effects on animals. For humans, annoyance is considered to be the primary environmental noise effect; thresholds for annoyance in terms of sound exposure have been determined by surveys as described in Section A.3. However, for animals, the effects are not easily determined. Usually the studies require introduction of a specific noise event like an aircraft overflight and a subsequent observation of animal response. Observations of response to noise range from no reaction or mild responses such as slight changes in body position to extreme responses such as panic and attempts to escape. Long-term effects that might change behavior tend to be affected by factors other than short term noise exposure, such as weather, predation, disease and other disturbances to animal populations. Conclusions from research conducted to date provide only preliminary indications of the appropriate descriptor, rough estimates of threshold levels for observed animal disturbance, and habituation characteristics of only a few species. Long-term effects continue to be a matter of speculation."

Moreover, most of the noise events used in prior studies are related to aircraft overflights. Consequently, any criteria adopted for effects on animals by high-speed rail noise must be considered interim until further specific research results are known.

The FRA report gives is the following synopsis of noise impacts observed in the literature:

Species	Noise Source	Sound Level (dB)	Behavioral Response
Reindeer	Sonic booms	Not stated	Startle
Caribou	Aircraft	Not stated	panic running
Pronghorn antelope	helicopter	77 dBA	Running
Domestic chicken		100 dB	Blood composition
		115 dB	interrupt brooding
Quail		80 dB	accelerated hatching
seabirds (general)	Sonic boom	Not stated	startle, flush from nest
California condor	Blasting, drilling	Not stated	Flush from nest
Raptors	Sonic booms	Not stated	Alarm

Project construction will cross the wetlands complex where the noise environment is usually exceptionally quiet (except for gunshots in the duck clubs). The Draft EIR/S must describe as fully as possible what are the expected construction noise and vibration impacts to wildlife species.

Water Flow and Water Quality

The DEIR/S does not acknowledge the potential construction impact on water flow and water quality. The GEA wetlands are a complex of natural and man made channels which move

water through the wetlands, establishing the waterfowl habitat and supporting nearly all the GEA ecological functions. The HST would probably be constructed on an earthen berm through most of the GEA, elevated above the flood level, in the same manner as rail road lines of the 19th century (see the Santa Fe Grade as an example). The berm would need to be wide enough for two tracks.

Construction of the berm would entail tremendous wetland fill and the importation of possibly a million cubic yards of fill, depending on the actual route taken. It is unlikely that the earth for the berm could be excavated from along the route due to soil weigh bearing limitations. The berm would need to be keyed in to the substrate, meaning that the organic top layer would be removed and drainage ditches and water pumps would be installed to allow engineered placement of fill. Even where trestle construction crossed water channels, there would be disturbance from clearing and pile driving.

All that construction will alter the present water flow patterns, introduce sediment and create stagnant sections of the wetlands producing essentially permanent water quality degradation. Water quality impacts on wildlife range from altered growth of feed to increased risk of avian botulism.

The Grassland Water District has spent much time and money managing the application of water in the Grasslands. Historically, water quality problems in the Grasslands have had tremendous impact on wildlife (e.g. the Kesterson Wildlife Refuge). Imposition of a hydraulic barrier across the GEA will materially impact the south-to-north water management in the GEA which is essential to maintaining water quality. The EIR/S needs to take in to account the phenomenal complexity of the hydrology of the Grasslands.

III. Operations Impacts of the HST Must be Addressed in the EIR/S

Operations impacts that need to be explicitly addressed include train noise and vibration, shock wave, train collisions with large animals, and interruption of habitat connectivity.

Noise and Vibration

The Draft EIR/S noise analysis compares the various routes for noise sensitivity and compares the HST alternative with the other alternatives. However, the Draft EIR/S never actually states anything about what the actual noise exposure will be in decibels, at varying distances from the track. I find this extraordinary.

The DEIR offers no quantitative analysis of actual impact. Indeed, the DEIR never actually tells the reader how much noise the trains produce. Information relevant to assessment of high-speed train noise on wildlife contained in the EIR is includes:

> " Similarly, "quiet suburban" and "rural" or "natural open-space" areas are grouped as areas where ambient noise levels are less than 55 dBA Ldn." (DEIR p. 3.4-4)
>
> "While high-speed trains have some similar noise and vibration characteristics to conventional trains, they also have several unique features resulting from the reduced size and weight, the electrical power, and the higher speed of travel. The proposed HST would be a steel-wheel, steel-rail electrically-powered train operating in an exclusive

right-of-way. Because there would be no roadway grade crossings, the annoying sounds of the train horn and warning bells would be eliminated. The use of electrical power cars would eliminate the engine rumble associated with diesel-powered locomotives." (DEIR p. 3.4-9)

"For the proposed HST system higher operating speeds of 150 to 220 mph (241 to 354 kph) would be planned for the less constrained areas, in terms of alignment (i.e., flat and straight)." (DEIR p. 3.4-9)

"In the speed range from 60 mph to about 150 mph (98 kph to 241 kph), mechanical noise
resulting from wheel/rail interactions and structural vibrations dominate the noise emission from trains." (DEIR p. 3.4-9)

"Noise from HST also depends on the type and configuration of its track structure. Typical noise levels are expressed for HST at grade on ballast and tie track, the most commonly found track system. For trains on elevated structure, HST noise is increased, partially due to the loss of sound absorption by the ground and partially due to extra sound radiation from the bridge structure. Moreover, the sound from trains on elevated structures spreads about twice as far as it does from at-grade operations of the same train, due to raising the sound source higher above ground." (DEIR p. 3.4-10)

"Vibration of the ground caused by the pass-by of the HST is similar to that caused by conventional steel wheel/steel rail trains. However, vibration levels associated with the HST are relatively lower than conventional passenger and freight trains." (DEIR p. 3.4-10)

An indicative measure of actual noise exposure can be found in the Federal Railroad Administration (FRA) assessment: an electric locomotive train passby (2 engines, 10 passenger coaches) at a maximum speed of 150 mph in a flat area with no shielding will produce an Lmax sound level of 99 dBA at 50 feet from the train. That study also rated as "severe impact" any case where the project noise exceeded 60 dBA where the ambient noise level was near 50 or 55 dBA Ldn, as would be the case in the study area, according to the EIR criterion below. The FRA report also stated as a threshold for significant noise impacts on wild birds and mammals a sound level of 100 dB SEL – definitely the same range as the sound level of the train passbys. The SEL is a measure of all sound energy during an event expressed as the equivalent sound level with a duration of one second.

Figure 2.6-1 of the EIR shows that the trains will be operating at speeds in excess of 200 mph in the Stockton to Bakersfield and Merced to Gilroy segments so the noise impact would actually be greater than that estimated in the sample case analyzed in the FRA report. The sound energy radiated from a source is proportional to its power input. As a rough rule, the power input increases as the square of velocity, so a train at 200 mph will need 1.8 times the power as a train at 150 mph. Sound is measured on the logarithmic decibel scale; the logarithm of the power ratio is 2.5 dB, meaning that the Lmax noise from the train at 200 mph is expected to be around 101.5 dB.

Even at high speed, the train will take three to four seconds to pass a point receptor. This means the SEL at 50 feet distance is probably around 105 to 110 dB. With 3 dB drop-off per

doubling distance for a line source, the high speed train will likely exceed the FRA significance threshold for wild birds and mammals out to a distance of 500 feet.

Train frequency determines the overall impact of the project. The EIR (Summary p. S-4) states that there would be 86 weekday intercity trains envisioned by the project by 2020. A chart in Appendix E to a technical report on operations that lays out the proposed schedule of trains for the Pacheco route, 134 total daily trains will pass through Los Banos (not all stopping). This is an average of a train every 11 minutes, but as much as a train every 5 minutes during the busy portion of the business day.

The high frequency means that startle effects will be frequent and that the overall sound level will rise substantially. It is difficult to estimate the impact of this project due to the absence of quantitative information in the DEIR A rough calculation based on the FRA data shows that a 200 mph train every 5 minutes would produce an average sound level (Leq) of 75 dB at 500 feet from the line. That is more noise that is produced by most busy freeways.

There is a high probability of significant impacts to wildlife. The EIR must evaluate the actual likely impacts of the train noise and vibration on the sensitive wildlife species who will be exposed to these noise levels on a daily basis.

Shock Wave

High speed trains will produce a significant shock wave each time they pass. The shock wave can be felt at varying distances from the train, depending upon its speed. The shock wave has been likened to the impact of a supersonic plane breaking the sound barrier. Howe M. S. "The compression wave produced by a high-speed train entering a tunnel." *Proceedings: Mathematical, Physical & Engineering Sciences* 1 June 1998, vol. 454, no. 1974, pp. 1523-1534(12) URL: http://www.ingenta.com/isis/searching/ExpandTOC/ingenta ?issue=pubinfobike://rsl/rpa/1998/00000454/00001974&index=2 It can produce a startle response in wildlife or if birds are flying within the immediate area of the train passes can possibly interrupt their flight. The EIR/S should quantify the shock wave that emanates from the train moving at over 200 mph, and determine all of its potential effects on wildlife.

Collisions with trains (large animals)

Animals that may be crossing the tracks in the GEA can be hit by one of some 100 plus trains per day. Although a likely mitigation for the project will be subterranean tunnels to allow wildlife passage (EIR/S p. 3.15-31) there may still be substantial numbers of wildlife who attempt to cross the track at grade level and may be hit by trains. Species at risk include San Joaquin kit fox, tule elk and bobcat. The EIR/S should estimate the mortality to each wildlife species that is vulnerable to train collisions and the effect of this mortality on the respective populations. For special status species such as the San Joaquin kit fox the EIR/S should also discuss whether these train impacts are substantial enough to cause further decline in the status of the species, or will interfere with the recovery of the species.

Interruption of Habitat Connectivity

The EIR/S states (p. 3.15-) "Segments that would be placed at grade (cut and fill) would require fencing the HST alignment for the safety of humans, as well as protection from train-wildlife collisions, and would have the potential to interfere with wildlife movement." On p.